REMARKS

This preliminary amendment presents a substitute specification, an amended abstract, and a new set of claims.

A marked-up copy of the substitute specification, showing additions to the translation by underlining and deletions from the translation by strike-through, is attached as Appendix III. The substitute specification includes no new matter.

Respectfully submitted,

Date: March 16, 2005

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~~WO 2004/028857~~ ~~PCT/EP2003/009095~~

~~Cushion for a vehicle seat~~ CUSHION FOR A VEHICLE SEAT

BACKGROUND AND SUMMARY OF THE INVENTION

[0001] ~~The~~ This invention relates to a cushion for a vehicle seat ~~according to the pre-characterizing part of claim 1~~.

[0002] In a ~~known~~ cushion of this type ~~(DE 33 06 871 A1)~~ known from German document DE 33 06 871 A1, shells are fitted into longitudinal grooves arranged in the seat area and/or backrest area of the cushion core, these shells being open toward the outside and being connected at one end to a suction pump via a main connection tube. In an alternative configuration of this known vehicle seat, the cushion core is provided with channels which pass through the entire thickness of the core. The channels are open at both ends and open out freely on the underside of the cushion, since in this area they pass through a seat bucket of the vehicle seat receiving the cushion. Both structural configurations of the cushion involve air extraction or air exchange in order to carry away the heat and moisture which form between the covering layer and the cushion when the seat is occupied by a passenger, and in order thereby to improve the climate of the vehicle seat.

[0003] In a heated vehicle seat known from U.S. Patent 5,524,439, the cushion body of the seat cushion and backrest is provided, underneath a covering layer over the cushion body, with transverse grooves into which there open air

inlet channels extending through the cushion body at right angles to the transverse grooves. Temperature-controlled warm air, generated in a heating pump with heat exchanger, is blown into the inlet channels.

[0004] In a vehicle seat known from U.S. Patent Application Publication 2001/0035669 A1, the cushion body of a seat cushion comprises a network of channels which pass through the cushion body in a large number of different directions. In a central area, a number of channels of by comparison greater internal diameter pass more or less perpendicularly through the cushion body and open out at the underside of the body. Arranged below the mouths of these channels there is a fan which sucks air through the cushion from the upper face of the cushion body.

[0005] A vehicle seat known from U.S. Patent 3,770,318 has a seat cushion and a backrest in whose cushion bodies there are intersecting longitudinal and transverse grooves which are covered by a cushion lining. At the central area of the seat body, the cushion lining has four holes passing through it which communicate with the longitudinal and transverse grooves and with channels extending perpendicularly through the cushion body. Arranged directly underneath the holes, there are nonreturn valves which ensure that air does not flow out of the channels through the holes. The cushion body of the backrest has a similar design. At the end remote from the holes, the mouths of the vertical channels passing through the cushion bodies are connected to one another via a

connection tube. As a result of vibrations caused by the person seated on the seat cushion, air is pumped out of the channels of the seat cushion into the channels of the backrest, thereby ventilating the latter.

[0006] A water-impermeable and breathable lining for mattresses known from German document DE 201 20 207 U1 is composed of a layer of water-impermeable material in which intersecting longitudinal and transverse grooves are formed. Continuous tubes perpendicular to the layer are formed which, at one end, open into the points of intersection of the longitudinal and transverse channels and, at the other end, open out on the underside of the layer. By structuring the layer in this way, horizontal and vertical air intake and air removal is made possible during use of the mattress.

[0007] In a vehicle seat known from German document DE 198 05 173 C, the cushion in the seat part and backrest has a ventilation layer through which air can flow and a cushion lining stretched across the surface of the cushion directed toward the person occupying the seat. Air channels are worked into the cushion and open out from the underside and rear side of the cushion directed away from the cushion lining and open into the ventilation layer. In these air channels, there are miniature fans which force air from underneath or behind the cushion into the ventilation layer, and the air blown in is removed from the ventilation layer through channels which start from the ventilation layer and pass through the cushion.

[0008] In the case of a cushion for a vehicle seat of the type mentioned at the outset, that is to say a full-foam cushion, the object of the invention is to further improve the seat climate at minimal additional production cost.

[0009] According to the invention, this object is achieved ~~by the features of patent claim 1~~.

[0010] The cushion according to the invention for a vehicle seat, which can be a cushion for the seat part of the vehicle seat (seat cushion) or a cushion for the backrest (backrest cushion), has the advantage that the network of longitudinal and transverse grooves communicating with the environment via the channels passing through the cushion core ensures very good removal of moisture from the surface of the cushion core made of moisture-impermeable material. The moisture passing through the covering layer is transported via the longitudinal and transverse grooves to the mouths of the channels, and the moisture passes through the channels into the open. ~~With this passive removal of seat moisture, it is possible, without additional measures and devices, to achieve an efficiency equal to that which can be achieved in the known cushion only by means of active extraction of air. Overall, in an inexpensive and structurally low full-foam seat, it is possible to achieve very good air permeability and moisture uptake of the cushion without having to resort to expensive knitted spacer fabrics as are used in vehicle seats of a higher price category~~ The air which is

blown by the miniature fans into the network of longitudinal and transverse grooves, and which is removed again through the channels present in the cushion, generates a very intensive flow of air through the longitudinal and transverse grooves and very rapid removal of heat and moisture from the intermediate cushion area delimited by covering layer and cushion core.

[0011] Advantageous embodiments of the cushion according to the invention, with preferred refinements and configurations of the invention, are also set out in the ~~other~~ patent claims.

~~According to an advantageous embodiment of the invention, a fan for impacting a central area of the cushion with air is arranged on the side of the cushion core directed away from the covering layer and at a distance from said cushion core. By provision of this central fan, which blows air from outside onto the cushion core, the removal of moisture can be accelerated and, consequently, the comfortable seat climate can be maintained even in extreme situations.~~

~~According to an advantageous embodiment of the invention, a further possibility of so-called active removal of moisture is achieved by the fact that the cushion core is provided with at least one shaft which passes completely through the thickness of the core, said shaft being open to the outside of the cushion and opening into at least one of the longitudinal and/or transverse grooves. A miniature fan which is arranged in the shaft, and which is preferably positioned~~

~~in the cushion core by means of a grommet, sucks air from the area surrounding the cushion and blows this air into the network of longitudinal and transverse grooves, and this air is removed again via the channels present in the cushion. This very intensive flow of air in the longitudinal and transverse grooves permits very rapid removal of heat and moisture from the intermediate cushion area delimited by covering layer and cushion core.~~

[0012] The invention is described in more detail below on the basis of illustrative embodiments shown in the ~~drawing, where~~ drawings, in which each of the figures ~~each show~~ shows a schematic ~~views, specifically:~~ view.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] ~~Fig.~~ Figure 1 shows a plan view of a seat cushion of a vehicle seat with the covering layer partially cut away,

[0014] ~~Fig.~~ Figure 2 shows a cross section along the line II-II in ~~Fig.~~ Figure 1,

[0015] ~~Fig.~~ Figure 3 shows the same view as in ~~Fig.~~ Figure 1, but of a modified seat cushion, and

[0016] ~~Fig.~~ Figure 4 shows a cross section along the line IV-IV in ~~Fig.~~ Figure 3.

DETAILED DESCRIPTION OF THE INVENTION

[0017] A vehicle seat has, in a known manner, a seat part and a backrest which are both covered with a cushion. Figures 1 and 2 show only the seat cushion of the vehicle seat, but its structure, as described below, applies also to the backrest cushion.

[0018] The cushion is composed of a cushion core 11, made from a block of foam, and of an air-permeable and moisture-permeable covering layer 12 which covers the cushion core 11 and which in turn has a support 13 made of reticulated foam and an air-permeable lining 14 which secures the support 13 on the surface of the cushion core 11. The lining 14 is made of fabric or of perforated leather. In some cases, the support 13 can be replaced by a nonwoven or can be omitted altogether. A heating mat for heating the seat is normally also inserted into the support 13, but this is not shown here. The cushion 10 in the seat part is fitted on a seat bucket or, as in the illustrative embodiment described, on a sprung core 15 which is secured in a seat frame of the seat part.

[0019] In the cushion core 11, longitudinally extending grooves 16 and transversely extending grooves 17 are formed in the surface directed toward the covering layer 12. The longitudinal and transverse grooves 16, 17 intersect one another and are open toward the covering layer 12. At the points of intersection of longitudinal grooves 16 and transverse grooves 17, the cushion core 11 has

channels 18 which pass through the entire core thickness of the cushion core 11 and open out freely on the outer face of the cushion core 11 directed away from the covering layer 12. The longitudinal grooves 16, the transverse grooves 17 and the channels 18 are produced during the foaming of the cushion core 11.

[0020] The network of longitudinal grooves 16 and transverse grooves 17, in conjunction with the channels 18, ensures that moisture produced by the occupant of the seat is removed from the covering layer 12 to the outside of the cushion 10. The moisture is transported through the longitudinal and transverse grooves 16, 17 to the hollows where the mouths of the channels 18 lie, and the moisture passes through these channels 18 into the open. In this way, in a so-called full-foam cushion whose cushion core is not itself permeable to moisture, a comfortable seat climate is generated, as is achieved, in the case of expensive seats, only by using expensive knitted spacer fabric across the cushion core 11.

[0021] As is illustrated in ~~Fig.~~ Figure 2, a fan 20 can also be arranged outside the cushion (underneath it in the case of a seat cushion) at a distance from the latter on the vehicle seat, and this fan 20 causes air to impact a central area of the cushion core 11. By means of this central fan 20, air from the area surrounding the cushion is blown into the channels 18 located in the central area of the cushion core 11. This air passes into the network of longitudinal grooves 16 and transverse grooves 17 and flows back to the outer face of the cushion via the channels 18 present in the edge area of the cushion core 11. The air flow is

indicated by arrows in ~~Fig.~~ Figure 2. This active removal of moisture from the cushion greatly increases the effectiveness of the removal of moisture which passes through the air-permeable and moisture-permeable covering layer 12 into the longitudinal and transverse grooves 16, 17.

[0022] In the cushion shown in Figures 3 and 4 and intended for a vehicle seat, an alternative embodiment for active removal of moisture from the full-foam cushion is illustrated. The structure of the cushion with cushion core 11 and covering layer 12 and with the longitudinal grooves 16, transverse grooves 17 and channels 18 formed in the cushion core 11 is unchanged and is as described above with reference to Figures 1 and 2. In addition, two shafts 21 spaced apart from one another are also present in the central area in the cushion core 11, and, like the channels 18, they pass through the entire core thickness of the cushion core 11 and, at one end, open out at the point of intersection of a longitudinal groove 16 and a transverse groove 17 and, at the other end, open out freely on the outer face of the cushion core 11, but have a much greater internal diameter compared to the channels 18. In the illustrative embodiment described, both shafts 21 are arranged in the center axis of the cushion core 11, one shaft 21 lying more or less centrally in the cushion core 11 while the other shaft 21 is offset closer to the front edge of the cushion core 11. Arranged in each shaft 21 there is a miniature fan 22 which is secured in a known manner in the cushion core 11 via a grommet (not shown here). By means of the two miniature fans 22, air is sucked in from the outside of the cushion and is forced through the shafts

21 into the network of longitudinal grooves 16 and transverse grooves 17. There, the air picks up the moisture and flows through the channels 18 back to the outside of the cushion core 11.

~~Abstract~~ ABSTRACT OF THE DISCLOSURE

~~The invention relates to a~~ A cushion ~~with~~ has a cushion core, particularly made of a foam material, and ~~with~~ an air-permeable and moisture-permeable covering layer that covers ~~said~~ the core. To improve the climate comfort by ensuring good removal of moisture from the area between covering layer and cushion core, longitudinal and transverse grooves, spaced apart from one another, are formed in the surface of the cushion core covered by the covering ~~layer, these~~ layer. These grooves ~~being~~ are open toward the covering layer and ~~intersecting~~ intersect one another. In addition, the cushion core is provided with channels which pass through the entire thickness of the core and which, at one end, open out at the points of intersection of the longitudinal and transverse grooves and, at the other end, open freely to the outside of the cushion core.